



STRAINERT CLEVIS PINS/BOLTS  
MODEL CW-XXXXXXXXX  
USER MANUAL





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## Introduction:

The STRAINERT Wireless Load Sensing Clevis Pin/Bolt and Load Monitoring Software provides a convenient method of displaying force readings on a computer through a wireless interface. The program provides monitoring capability for up to 5 Load Sensing Clevis Pins/Bolts. These can be configured as single axis, bi-axial, or dual bridge. Each Pin/Bolt includes a durable battery capable of over 5000 hrs. of operations at line of sight distances up to 3000 feet. Data Logging and Field calibration capabilities are also provided. All STRAINERT Load Sensing Pins/Bolts are internally gaged and protected inside high strength stainless steel bodies, which provides protection from the environment and minimizes damage during installation and operation.

## Strainert Wireless System Capabilities

Sensor Type: Wireless Pin/Bolt (Uni-axial, Bi-axial, Dual Bridge) See Customer Drawing (QXXXXX-100-1-B)

Bridge Resistance: 350 Ohms (Min.)

Bridge Type: Full Bridge

Minimum Sensitivity: 1-mV/V

Maximum Number of Sensors: 5 single, dual bridge, or bi-axial load sensors

Unipolar / Bipolar Operation

Units: lbs., KIPS, Tons, Metric Tons, kg, kN

Sensor Excitation: 2.075 VDC

Transmission Distance:

Range	Minimum (ft)	Line of Sight (ft)
Standard	30	>3000
Short	1	>500

Carrier Frequency: 916 Mhz Spread Spectrum Frequency Hopping

Data Update Rate: Readings are averaged over 250ms cycle and transmitted once a second.

A/D Resolution: 0.04% Unipolar Mode / 0.08% Bipolar Mode

Estimated Battery Life: 5,000 hours

Calibration: Field adjustable

Operating Temperature: -10 to 65 Deg. C (14 to 149 Deg. F)

Enclosure Dimensions: Per Customer Drawing

## Safety Information

### General Safety

Do not install or work on this equipment unless you have read and understand the instructions and warnings in this Manual. Proper care is your responsibility

Failure to heed any warnings may result in serious injury or death.



#### WARNING!

Use caution and follow applicable safety procedures when using wireless sensors. This program DOES NOT provide safety or emergency stop devices.



#### CAUTION!

Improper scaling of the Load Pin may result in readings that do not represent actual applied loads and may cause damage to pin and/or the surrounding structure, in addition to potential personal injury. The Customer must verify that all data entry values are correct and are entered in the proper fields.

## Warranty Information

### The Two Year Guarantee

Strainsert wireless force sensor products are guaranteed for a period of two years, after shipment to original purchaser, against any malfunction due to defects in materials or workmanship

Strainsert Company is not liable for consequential or contingent damages and its liability is strictly limited to the original purchase price of the product or its repair or replacement at Strainsert's option.

Strainsert Company will repair or replace under warranty, and return transportation prepaid, provided that:

- Full explanation of malfunction or defect is transmitted in writing to Strainsert Company; together with, if possible, application or short history of product use.
- Authorization to return product is obtained from Strainsert Company.
- Product is sent to Strainsert Company, 12 Union Hill Road, West Conshohocken, PA 19428, prepaid, properly packaged and insured at full value.
- Factory inspection and investigation discloses that malfunction or defect developed or appeared during normal and proper usage of product.
- This warranty is null and void in the event repairs or modifications are made by persons unauthorized by Strainsert Company.

### Notes:

1. To initiate warranty repair work, ALL above conditions must be complied with fully.
2. For beyond warranty repair work, the same conditions apply.
3. Calibration and/or investigation charges may apply when Strainsert products returned for warranty repair prove to be free of defect, and the problem lies in systems, components, circuits, test set-ups, etc., for which Strainsert has no responsibility.
4. For some special systems, Strainsert may utilize other manufacturers products. In these cases, the original equipment manufacturers warranty will apply.

### Radio Requirements

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

To comply with FCC and Industry Canada RF radiation exposure limits for general population, the antenna(s) used for this transmitter must be installed such that a minimum separation distance of 20cm is maintained between the radiator (antenna) and all persons at all times and must not be co-located or operating in conjunction with any other antenna or transmitter.

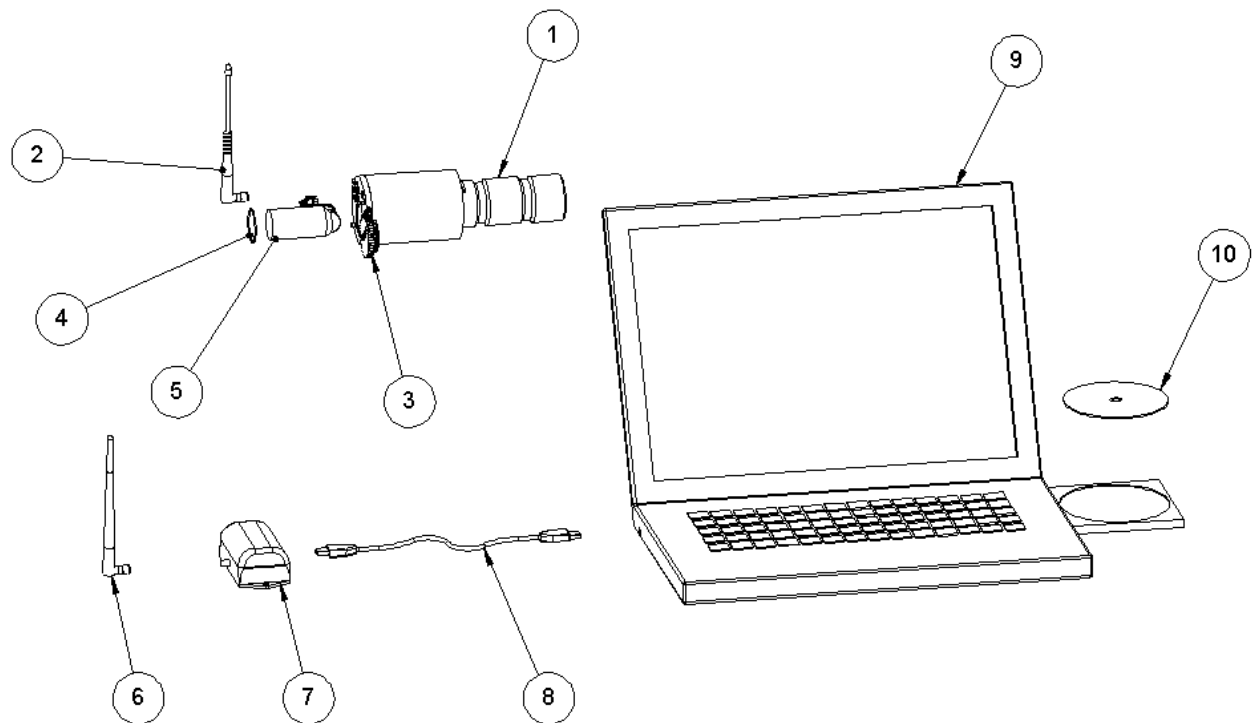
## System Overview





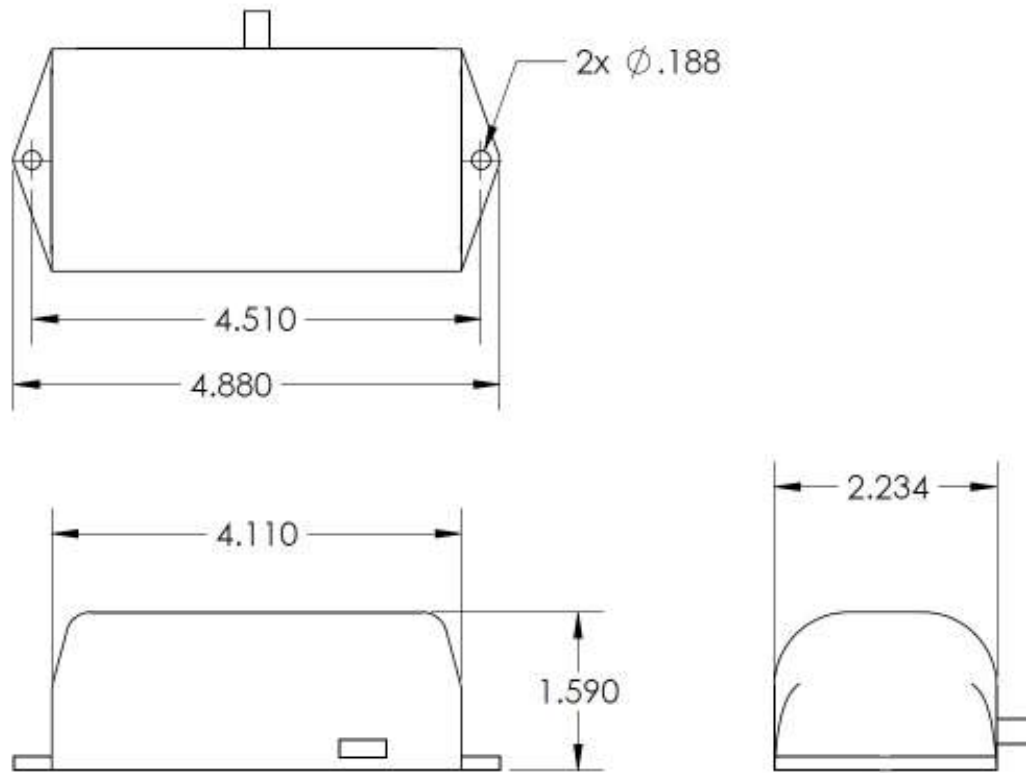
## Equipment

1. Clevis Pin/Bolt Transmitter / Receivers – includes: battery, transmitter / receiver circuit board, Model Nearson S161AH-915R, Fixed right-angle (Up to 5 units)
2. ModFLEX Mini Gateway – includes articulating antenna, USB cable (1ea.)
3. Load Monitoring System Installation CD (1ea.)

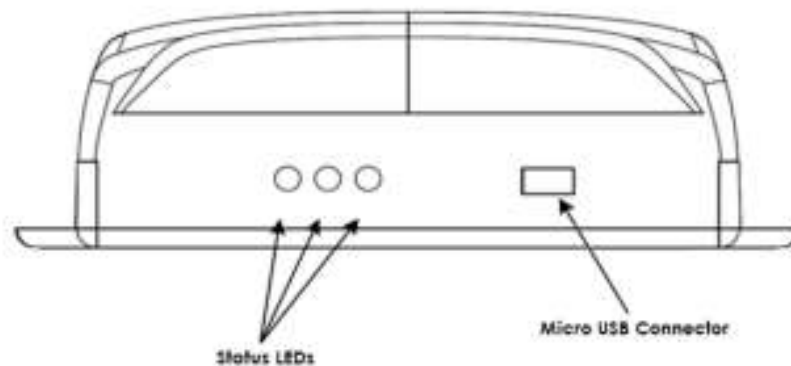


1	LOAD SENSING PIN/BOLT	6	ARTICULATING ANTENNA
2	RIGHT ANGLE ANTENNA	7	MOD FLEX MINI GATEWAY
3	BATTERY CAP	8	USB CABLE
4	O-RING	9	LAPTOP (NOT INCLUDED)
5	BATTERY	10	INSTALLATION CD

### Mini Gateway Mounting Requirements



### Mini Gateway Front Port Identification



Green – Indicates that the Gateway module is operational (heartbeat)

Yellow – Indicates that there is activity on the host interface

Red – Indicates RF activity

### Minimum System Requirements for Software

Operating System: Windows XP Professional Version 202 Service Pack 3

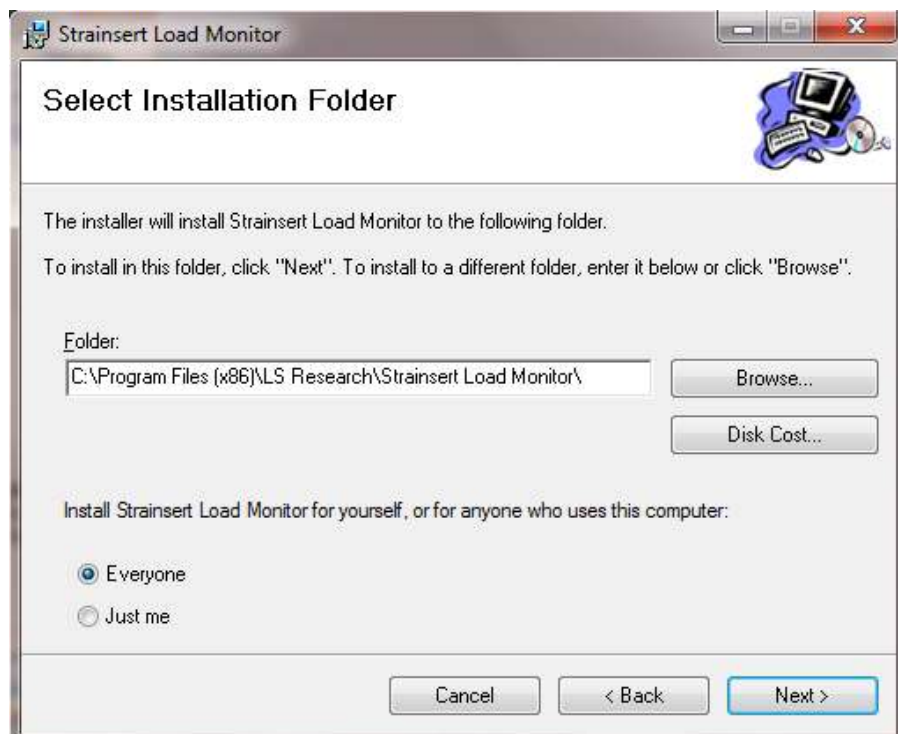
Processor: 2GHz

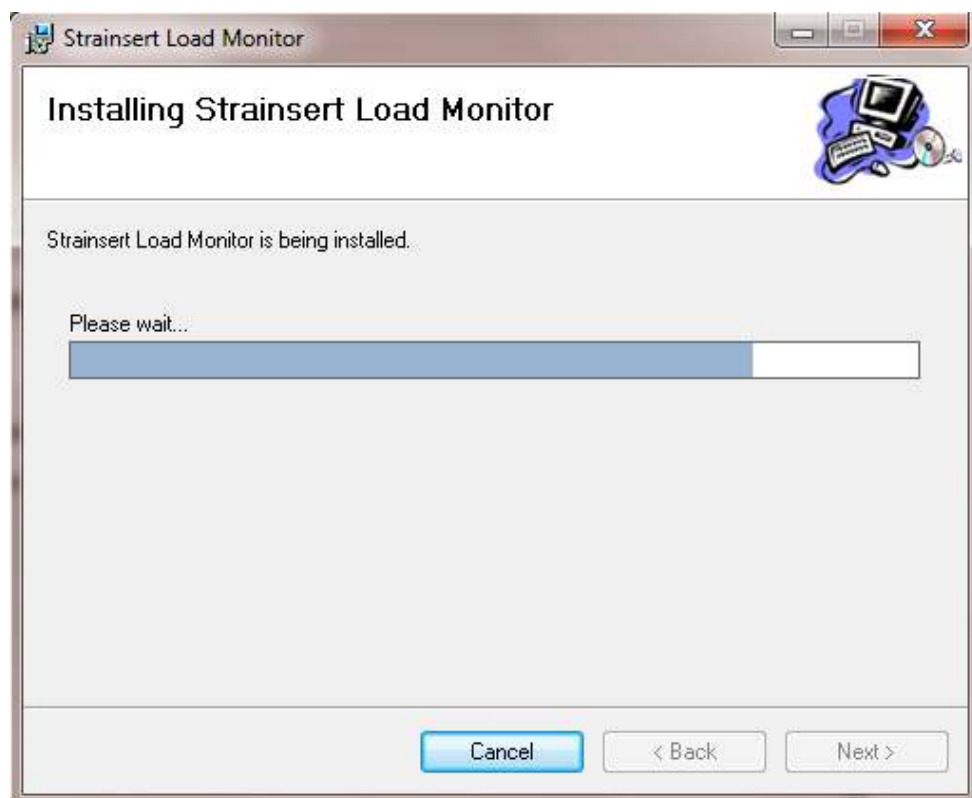
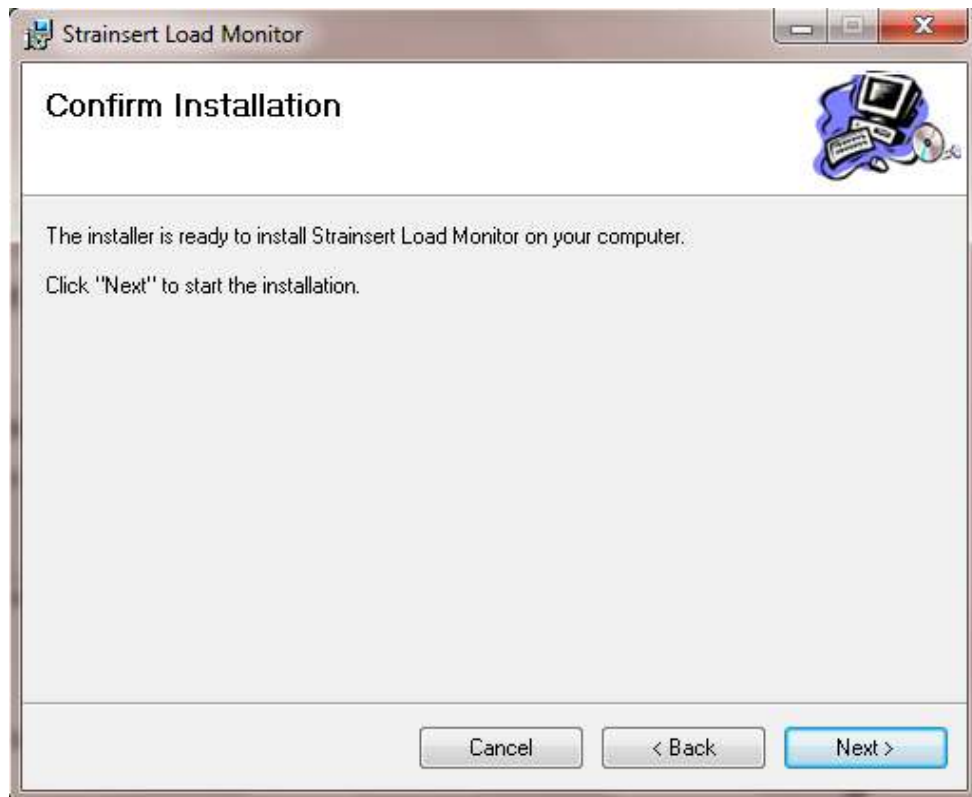
RAM: 2GB

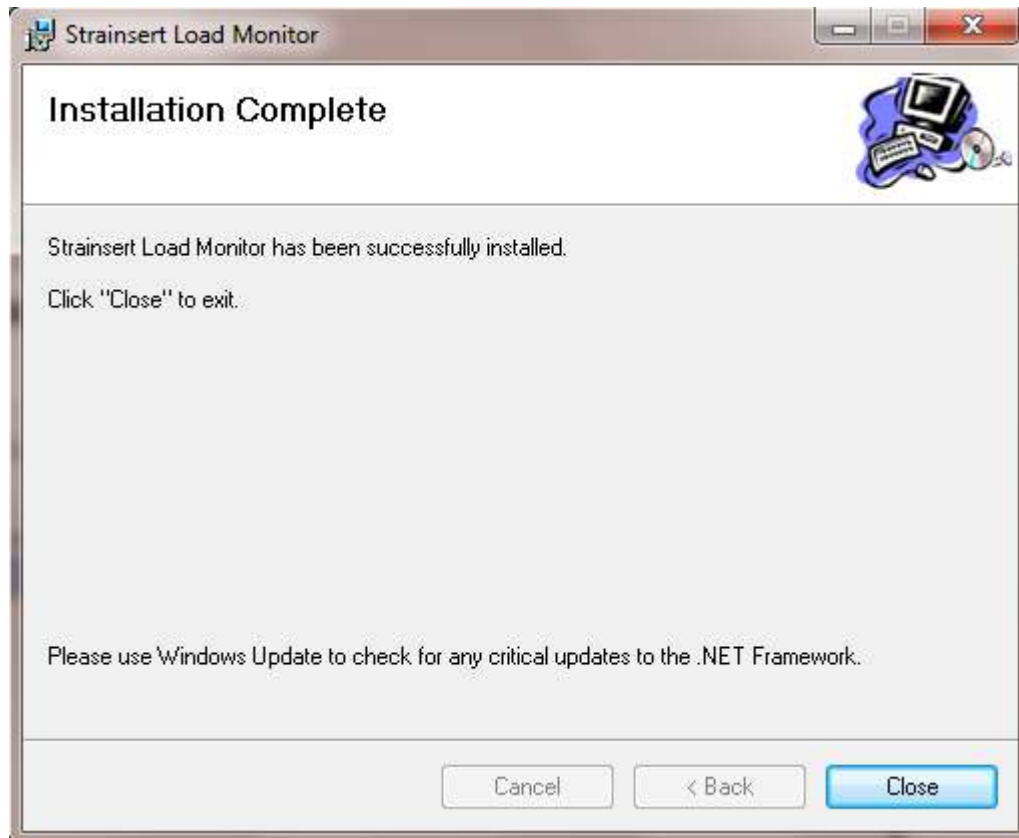
Hard Drive: 50MB of free space

## Software Installation

1. Prior to connecting the gateway USB, run the Strainert Installer program from CD provided. Minimum system requirements: Windows XP.
2. The installer will guide the user through the installation with prompts as follows:







**NOTE:** It is recommended that the user perform a re-boot prior to the hardware installation.

### **Hardware Installation**

1. Install Clevis Pin/Bolt in accordance with Customer drawing
2. Connect ModFLEX Mini Gateway USB cable to computer USB port.

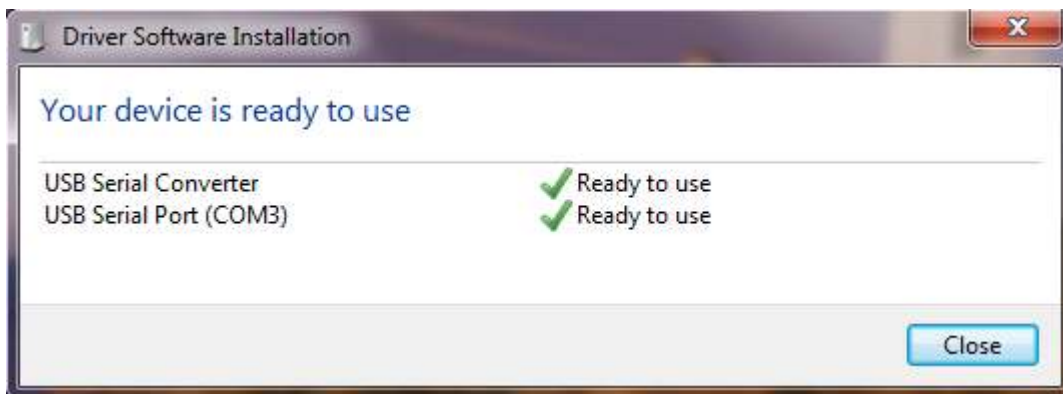


3. Connect the articulating antenna to Mini Gateway
4. Ensure that the gateway is operational by observing that the green Status LED (heart beat) is blinking.



#### Application Quick Start-Up

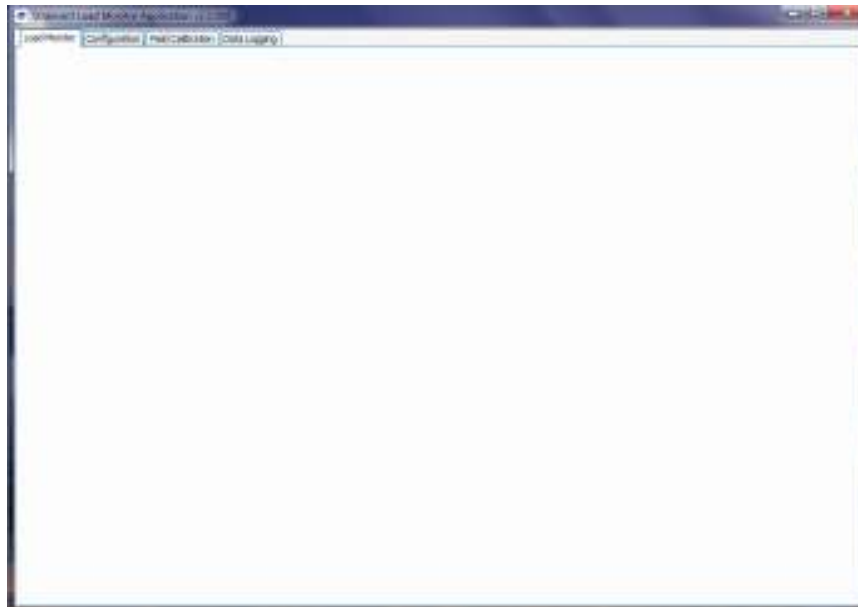
1. After connecting the ModFLEX Mini Gateway, pc or lap top will install device drivers.
2. Re-boot your computer.



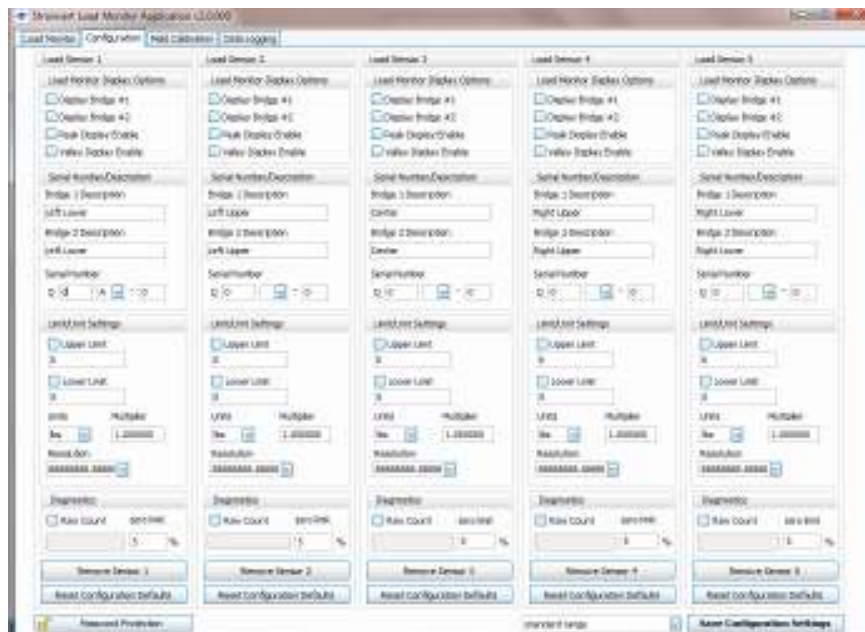
3. After re-boot, open Strainert Load monitor application.



- The application will open to the **Load Monitor** tab which will be blank.



- Select the **Configuration** tab.



- On the **Configuration** tab select the **Display Bridge #1** check box for single axis load cell and **Display Bridge #2** check box for dual bridge or bi-axial load cells under the **Load Monitor Display Options**.
- Enter the sensor **Serial Number(s)**



Strainert Load Monitor Application v2.0.000

Load Monitor Configuration Field Calibration Data Logging

Load Sensor 1

Load Monitor Display Options

☒ Display Bridge #1

☒ Display Bridge #2

☐ Peak Display Enable

☐ Valley Display Enable

Serial Number/Description

Bridge 1 Description

Sensor 1

Bridge 2 Description

Sensor 1

Serial Number

Q 21636 - 1

Limit/Unit Settings

☐ Upper Limit

0

☐ Lower Limit

0

Units Multiplier

lbs 1.000000

Resolution

88888000

Diagnostics

☐ Raw Count zero limit

5 %

Remove Sensor 1

Reset Configuration Defaults

Load Sensor 2

Load Monitor Display Options

☐ Display Bridge #1

☐ Display Bridge #2

☐ Peak Display Enable

☐ Valley Display Enable

Serial Number/Description

Bridge 1 Description

Left Upper

Bridge 2 Description

Left Upper

Serial Number

Q 0 - 0

Limit/Unit Settings

☐ Upper Limit

0

☐ Lower Limit

0

Units Multiplier

lbs 1.000000

Resolution

8888888.8888

Diagnostics

☐ Raw Count zero limit

5 %

Remove Sensor 2

Reset Configuration Defaults

Load Sensor 3

Load Monitor Display Options

☐ Display Bridge #1

☐ Display Bridge #2

☐ Peak Display Enable

☐ Valley Display Enable

Serial Number/Description

Bridge 1 Description

Center

Bridge 2 Description

Center

Serial Number

Q 0 - 0

Limit/Unit Settings

☐ Upper Limit

0

☐ Lower Limit

0

Units Multiplier

lbs 1.000000

Resolution

8888888.8888

Diagnostics

☐ Raw Count zero limit

5 %

Remove Sensor 3

Reset Configuration Defaults

Load Sensor 4

Load Monitor Display Options

☐ Display Bridge #1

☐ Display Bridge #2

☐ Peak Display Enable

☐ Valley Display Enable

Serial Number/Description

Bridge 1 Description

Right Upper

Bridge 2 Description

Right Upper

Serial Number

Q 0 - 0

Limit/Unit Settings

☐ Upper Limit

0

☐ Lower Limit

0

Units Multiplier

lbs 1.000000

Resolution

8888888.8888

Diagnostics

☐ Raw Count zero limit

5 %

Remove Sensor 4

Reset Configuration Defaults

Load Sensor 5

Load Monitor Display Options

☐ Display Bridge #1

☐ Display Bridge #2

☐ Peak Display Enable

☐ Valley Display Enable

Serial Number/Description

Bridge 1 Description

Right Lower

Bridge 2 Description

Right Lower

Serial Number

Q 0 - 0

Limit/Unit Settings

☐ Upper Limit

0

☐ Lower Limit

0

Units Multiplier

lbs 1.000000

Resolution

8888888.8888

Diagnostics

☐ Raw Count zero limit

5 %

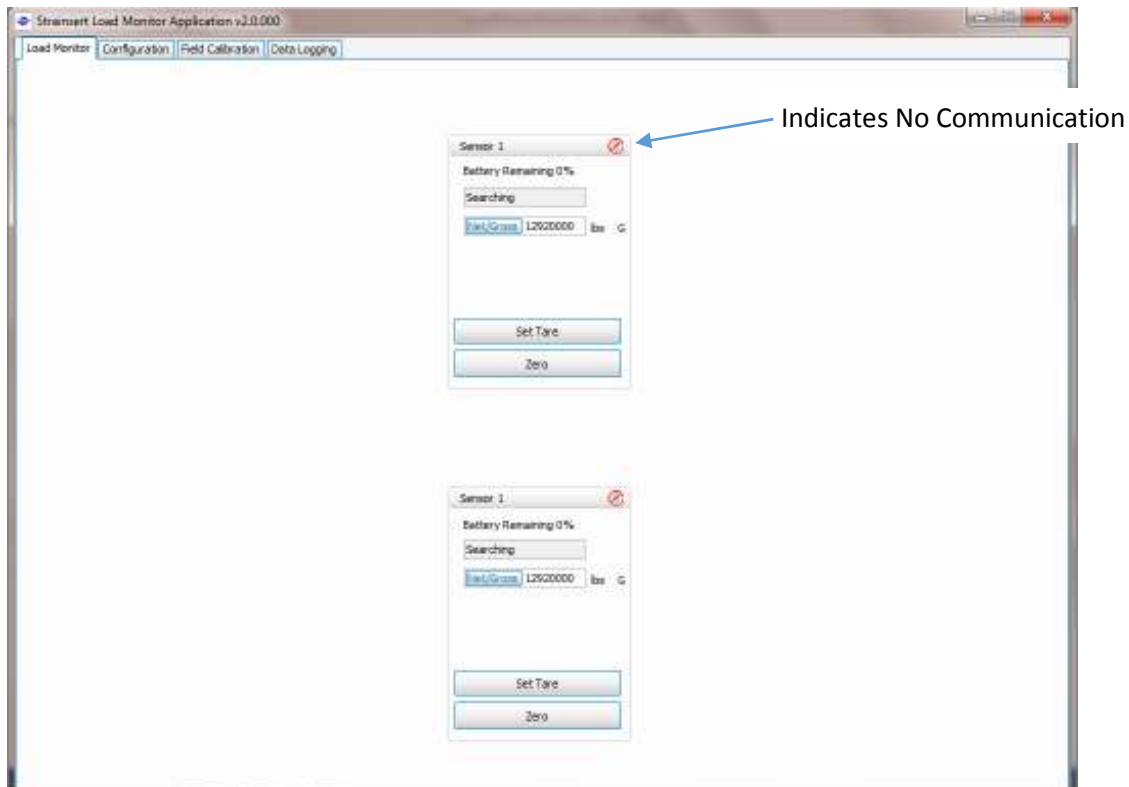
Remove Sensor 5

Reset Configuration Defaults

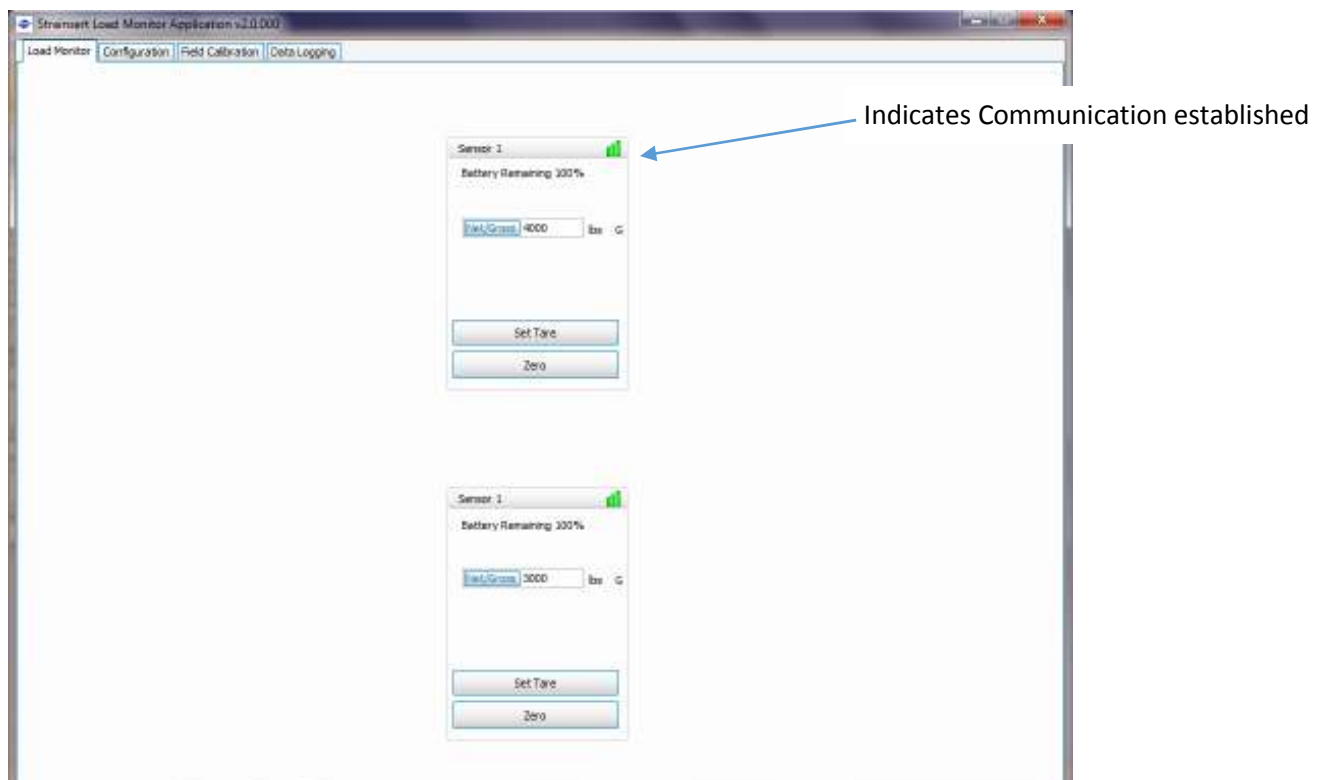
standard range Save Configuration Settings

Password Protection

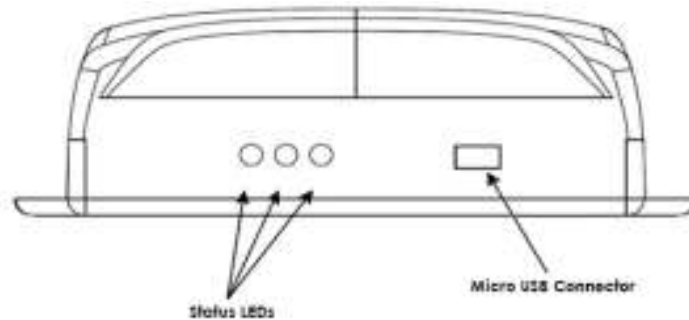
8. Enter **Bridge 1 / 2 Description** fields (optional)
9. After selections, **Save Configuration and Settings**.
10. To establish communication between the gateway and the **Transmitter / Receiver** unit, return to the **Load Monitor** tab.
11. The Load Monitor tab will display each selected sensor and bridge.  
Note: The initial communication link may take up to 3 minutes to connect.
12. Each bridge will indicate the attempt to connect by displaying **Searching** in a message for each sensor / bridge. NOTE: In the upper right corner of each sensor / bridge a red circle with a slash indicates no communication



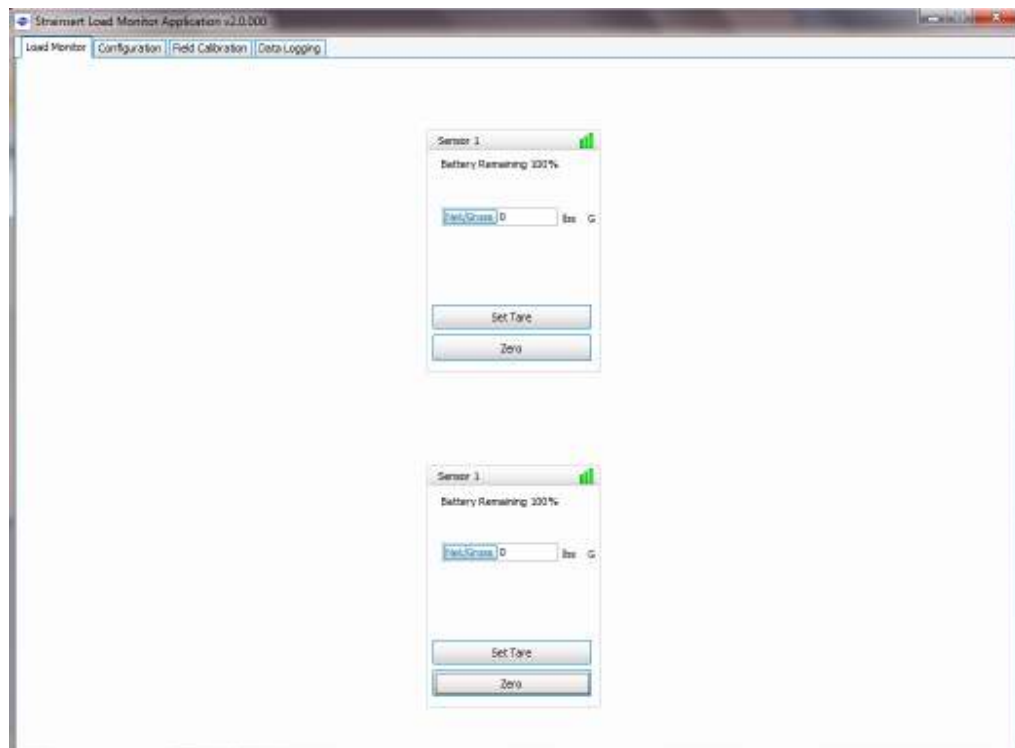
13. After communication is established, bars in the upper right corner will indicate signal strength. The sensor / bridge load readings will be displayed in the selected units.



14. Ensure that both the yellow and red Status LEDs on the gateway are blinking.

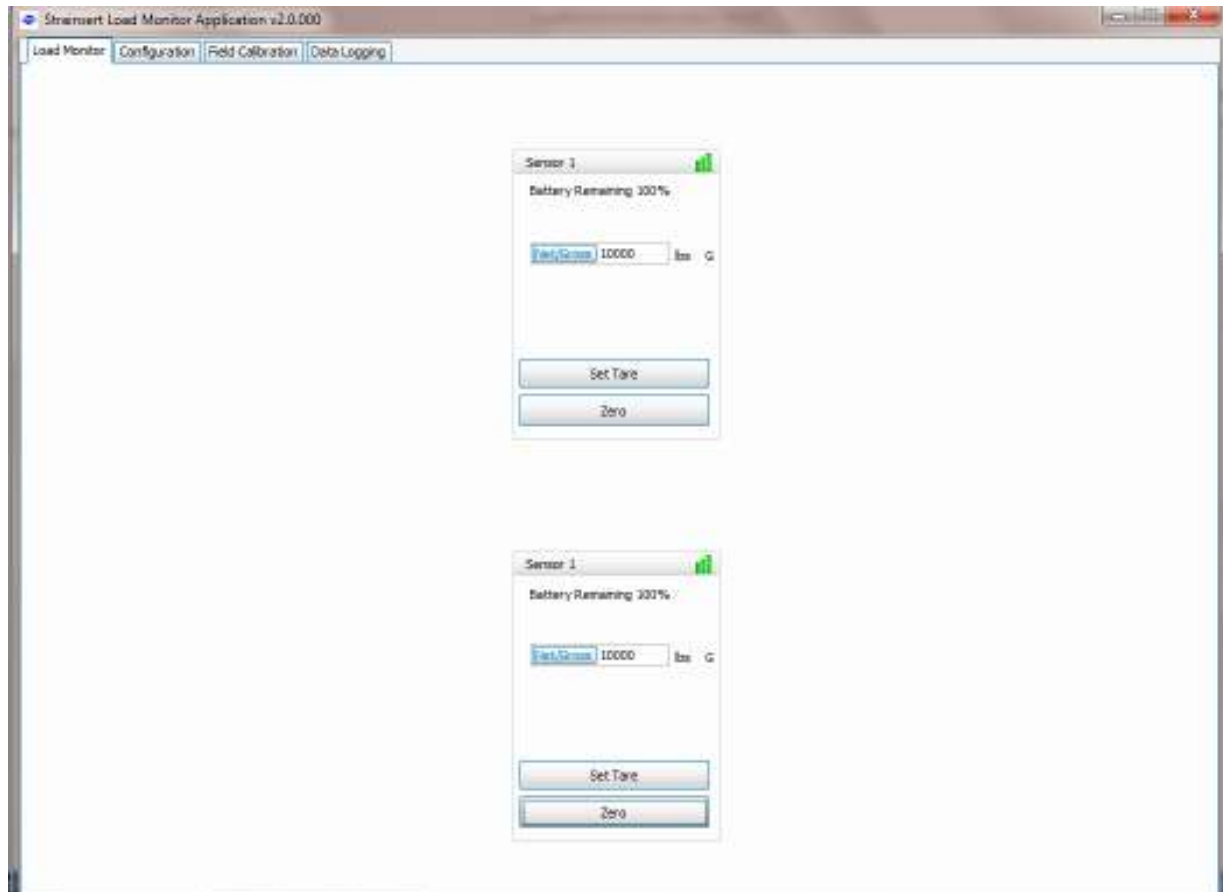


15. With no-load on the sensor, use **Zero** icon to null the sensor / bridge

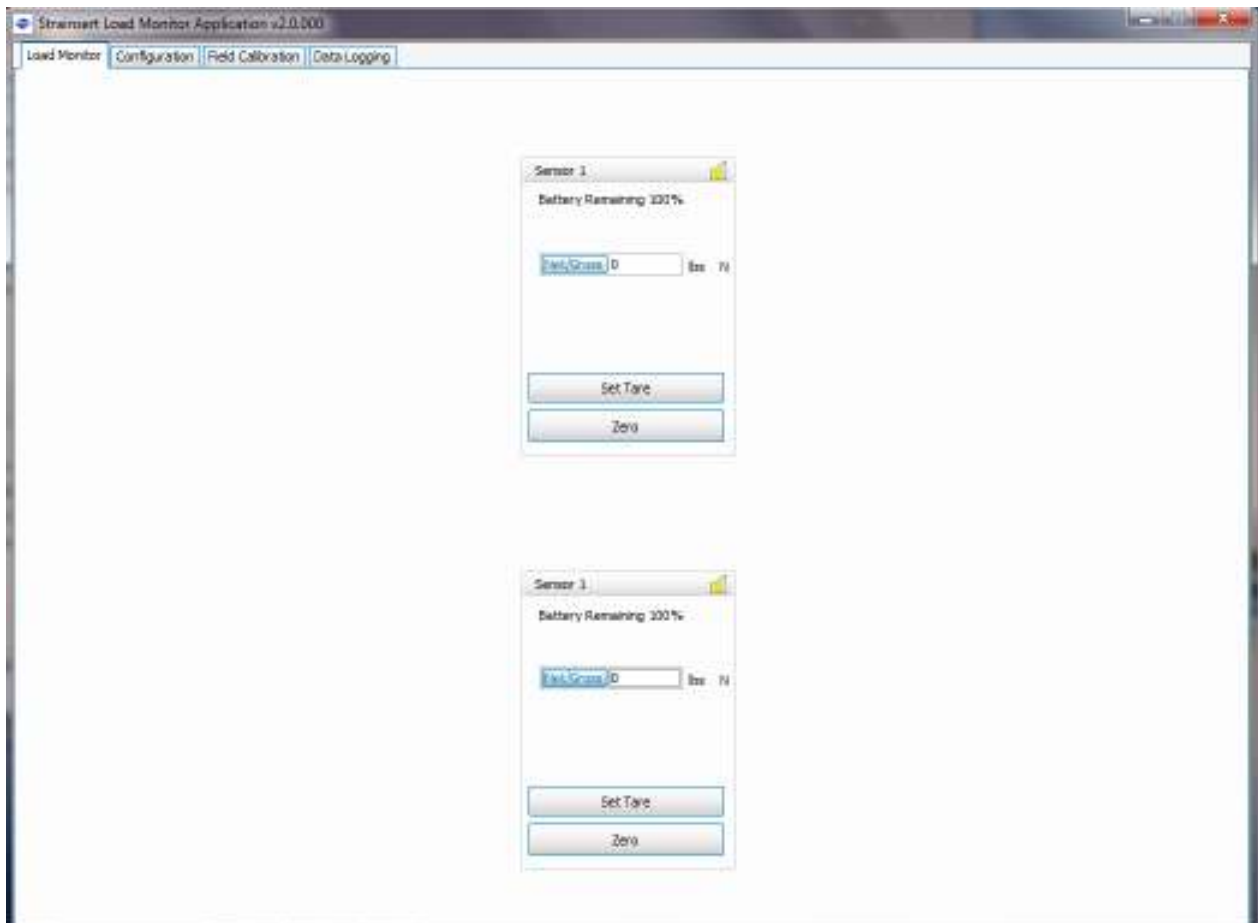


16. After zeroing the display, all readings are **Gross** measurements, which are indicated on the display with a **"G"** to the right of the engineering units.

17. The user may add any required Tare to the system at this point. Tare loads are stored when the user presses the **Set Tare** icon under each sensor / bridge display.

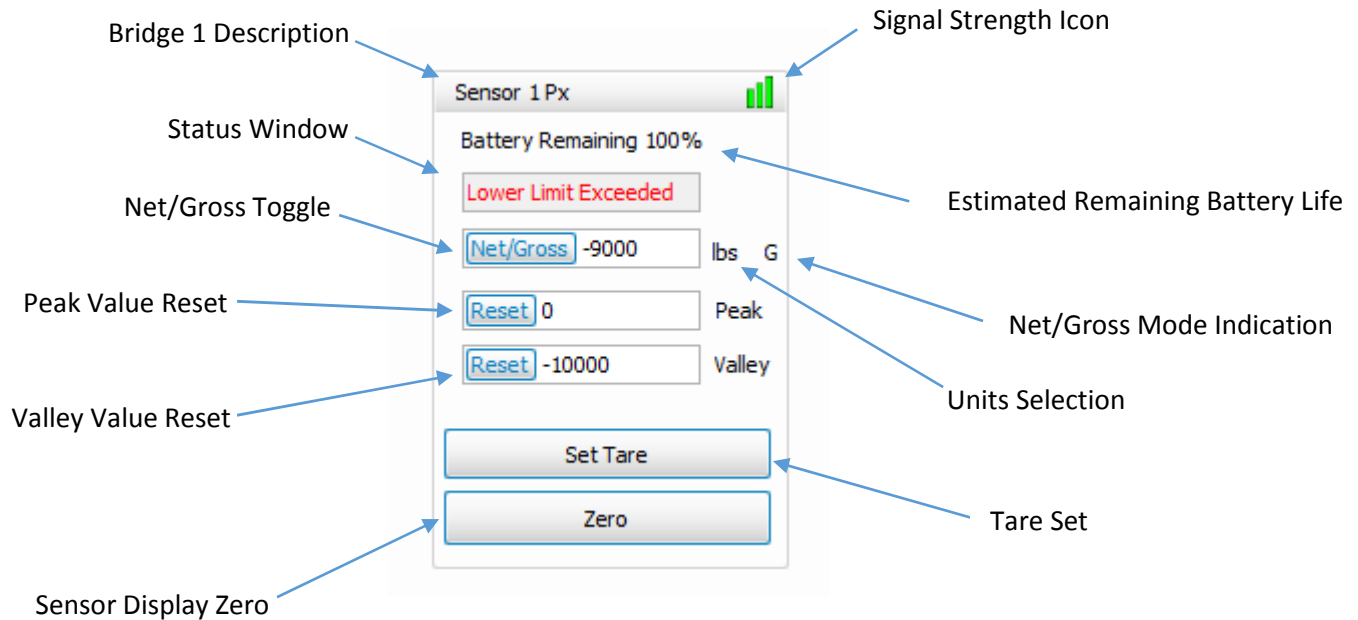


18. Press the **Net/Gross** button the left of the load display to toggle between the tared and untared condition. The **Net** mode is indicated with a “N” to the right of the engineering units.



19. The user may close out communication between the sensor and the gateway by pressing the “X” in the upper right hand corner of the application window.
20. With all configuration settings saved, the user can re-open the application at a later time and re-establish communication with the saved sensors.

## Load Monitor Tab Field Descriptions



**Bridge 1/2 Description:** Configuration tab text field as assigned for user.

**Status Window:** Indicates communication status, Upper / Lower Limit condition, Over and Under Range conditions. During normal operating conditions, the Status window is hidden.

Searching – wait period message during sensor / gateway communication synchronization (may take up to 3 minutes)

No Comms – indicates no communication between gateway and sensor

OVER-RANGE – sensor A/D maximum exceeded

UNDER RANGE – sensor A/D minimum exceeded

Upper Limit Exceeded – Set on Configuration tab

Lower Limit Exceeded – Set on Configuration tab

**Net/Gross Toggle:** Enables user to switch between Gross and Net measurements based on user Set Tare

**NOTE:** If closed and re-opened at any time, the application will always open in the Gross mode.

**Peak Value Reset:** clears the last stored peak reading.

**Valley Value Reset:** clears the last stored valley reading.

**Sensor Display Zero:** The Zero icon is used to null the sensor display with no load applied and is stored in non-volatile memory within the Strainsert Load Monitor application. The allowable Zero Limit can be changed on the Configuration tab. The default value is 5%. The maximum allowable Zero Limit is 40% of the full scale range of the sensor A/D.

Signal Strength Icon: color coded indication of relative transmission quality

Estimated Remaining Battery Life: percentage display of battery strength (remaining battery life is relative to consumption; displayed percentage of battery output)

Net/Gross Mode Indication:

N – Indicates Net Mode

G – indicates Gross Mode

Units Selection: user selected engineering units set on Configuration tab with Units drop down. Default units are "lbs"

Tare Set: stores the user applied tare weight in non-volatile memory within the StrainSert Load Monitor application.

NOTE: The user can Tare up to the full range of the sensor A/D. However, the usable span of the sensor is limited by the amount of Tare.

## Configuration Tab Field Descriptions

Enables Bridge #1 /#2 Display on Load Monitor Tab

Enables Peak / Valley Display on Load Monitor Tab

**Load Monitor Display Options**

- ☒ Display Bridge #1
- ☒ Display Bridge #2
- ☒ Peak Display Enable
- ☒ Valley Display Enable

Bridge #1 /#2 Load Monitor Tab Labels

Sensor Serial Number: user enters exact serial number of sensor.

Note: Serial Number is the ID required for the Load Monitor application to synchronize with the sensor receiver / transmitter.

Found on sensor nameplate and/or Strainsert Calibration Certificate

Note: "Q" is not required

If no letter suffix is included in the serial number, leave blank.

Enter numeric found after the dash in the serial number

**Serial Number/Description**

Bridge 1 Description

Sensor 1 Px

Bridge 2 Description

Sensor 1 Py

Serial Number

Q 21636 ☒ - 1



Upper Limit / Lower Limit– when checked, allows the user to change the Upper/ Lower Limit warning thresholds; a Status Window is triggered on Load Monitor Tab.

Defaults to unchecked;

Upper Limit defaults to sensor capacity and cannot be edited if check box is left unchecked.

Lower Limit defaults to 0 and can be edited independent of the check box

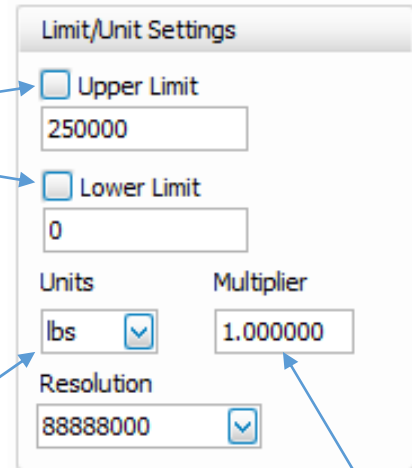
Units selection drop down – defaults to “lbs”.

User can choose from different engineering units for display on the Load Monitor tab

Upper / Lower Limits are recalculated based on the selection of units

Resolution – is the minimum unit of change displayed on the Load Monitor tab (i.e. 100, 1000, etc.)

The choice of Resolution in the drop down is limited by the sensor capacity, sensitivity and the range of the A/D. The application will determine what choices are allowed in the drop down.



Multiplier defaults to 1.000000. Can be used for custom scaling.

Note: When Multiplier is not equal to the default, an “M” will be displayed to the left of the Net/Gross icon on the Load Monitor tab

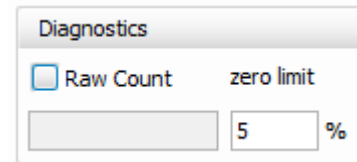
Raw Count – When checked provides the user with the ability to see the A/D counts for both bridges #1 / #2.

Defaults to unchecked

Capacity: 2,457 (Uni-polar Mode) / 1,229 (Bi-polar Mode)

A/D Over Range: 3,768 counts

A/D Under Range: 327 counts



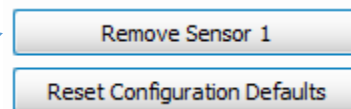
The image shows a 'Diagnostics' window. It contains a checkbox labeled 'Raw Count' which is currently unchecked. To the right of the checkbox is the text 'zero limit'. Below the checkbox is a text input field containing the number '5', followed by a '%' symbol. Two blue arrows point from the 'Raw Count' text in the first paragraph to the checkbox and the input field. A third blue arrow points from the 'Zero Limit' text in the second paragraph to the input field.

Zero Limit – allowable percentage that can be used to null the sensor output. This value is stored within the application and is retained until the user activates a new Zero.

Note 1: Default value is 5%

Note 2: The Zero amount is based on the absolute full scale output of the A/D operating range.

Removes all sensor information including Serial Number entries and any previously saved configuration settings.

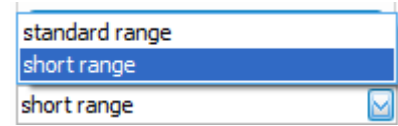


The image shows two buttons stacked vertically. The top button is labeled 'Remove Sensor 1' and the bottom button is labeled 'Reset Configuration Defaults'. A blue arrow points from the first paragraph to the 'Remove Sensor 1' button. Another blue arrow points from the second paragraph to the 'Reset Configuration Defaults' button.

Resets all configuration settings to original defaults but retains serial number information.

Transmission Range – there are two range selections:

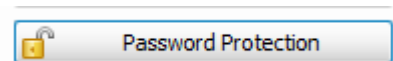
1. Standard Range (default)
2. Short Range (sensor to transmitter distances < 30-ft)



Save Configuration Settings – user must save all configuration changes after edits for changes to take effect.



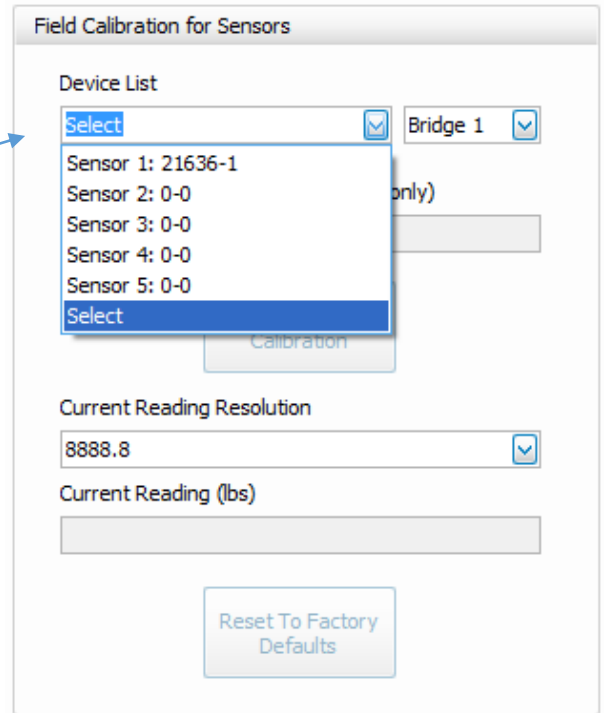
Password Protection – entry of a password disables changes to the Configuration and Field Calibration tabs



Note: User must Save Configuration Settings prior to attempting to set password

## Field Calibration Tab Field Descriptions

Device List – select sensor to be field calibrated from the drop down



Field Calibration for Sensors

Device List

Select ☐ Bridge 1 ☐

Sensor 1: 21636-1

Sensor 2: 0-0

Sensor 3: 0-0

Sensor 4: 0-0

Sensor 5: 0-0

Select

Calibration

Current Reading Resolution

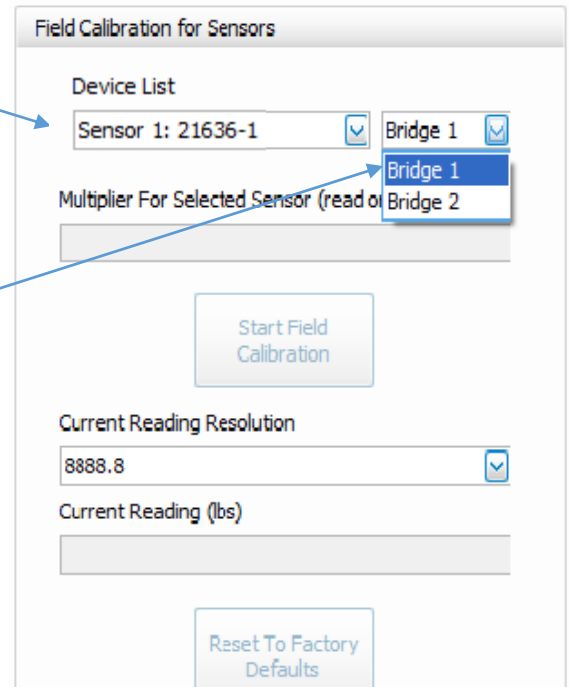
8888.8 ☐

Current Reading (lbs)

Reset To Factory Defaults

Shows a selected sensor

Select Bridge to be field calibrated



Field Calibration for Sensors

Device List

Sensor 1: 21636-1 ☐ Bridge 1 ☐

Multiplier For Selected Sensor (read only)

Bridge 1

Bridge 2

Start Field Calibration

Current Reading Resolution

8888.8 ☐

Current Reading (lbs)

Reset To Factory Defaults

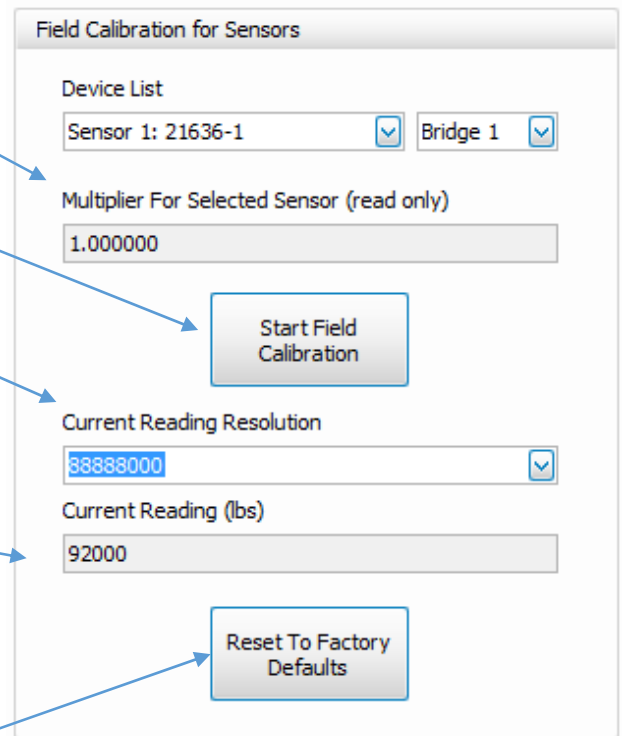
Multiplier For Selected Sensor – displays the Multiplier entered on the Configuration Tab.

Start Field Calibration – icon initiates the field calibration sequence

Current Reading Resolution – gives the user the ability to adjust precision during field calibration to increase accuracy.

Current Reading (lbs) – displays the current live weight reading.

Reset To Factory Defaults – pressing this icon resets the field calibration back to the factory default

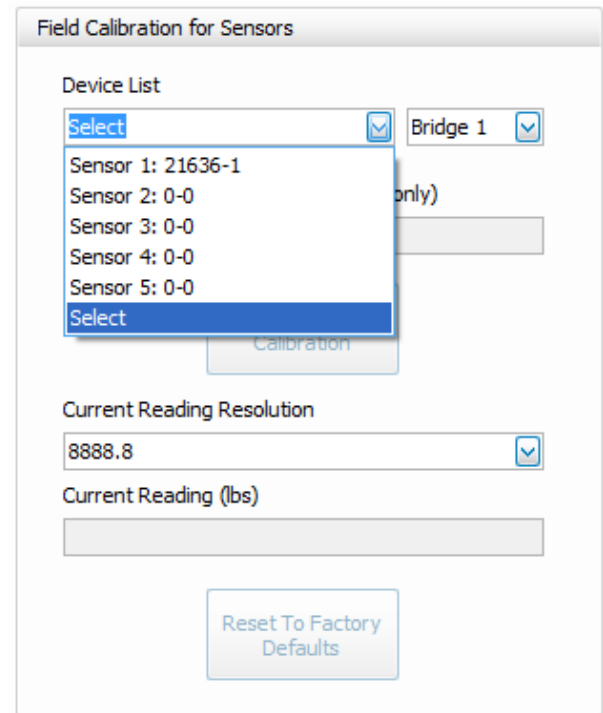


The dialog box titled "Field Calibration for Sensors" contains the following elements:

- Device List:** Two dropdown menus. The first is labeled "Sensor 1: 21636-1" and the second is labeled "Bridge 1".
- Multiplier For Selected Sensor (read only):** A text field displaying "1.000000".
- Start Field Calibration:** A button with a blue border.
- Current Reading Resolution:** A dropdown menu displaying "88888000".
- Current Reading (lbs):** A text field displaying "92000".
- Reset To Factory Defaults:** A button with a blue border.

## Field Calibration Procedure

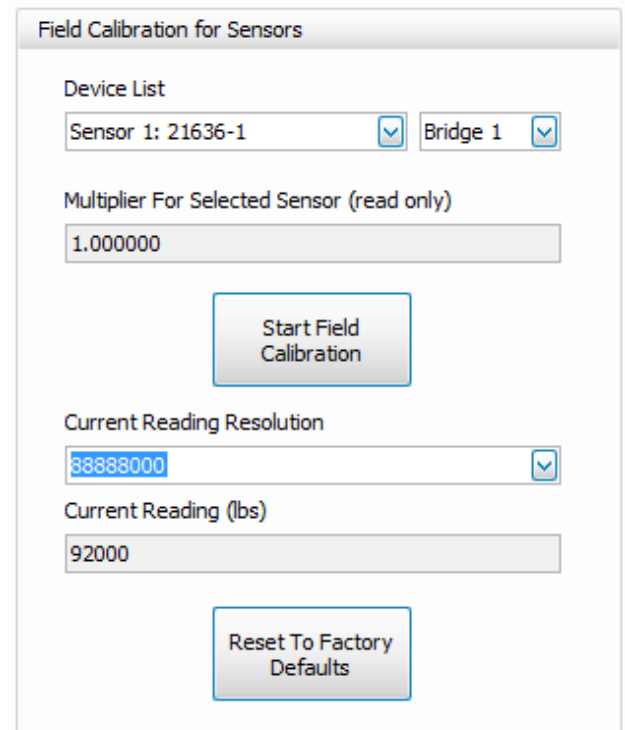
1. Open Field Calibration Tab.



The dialog box titled "Field Calibration for Sensors" contains the following elements:

- Device List:** A dropdown menu with "Select" at the top and "Sensor 1: 21636-1", "Sensor 2: 0-0", "Sensor 3: 0-0", "Sensor 4: 0-0", "Sensor 5: 0-0", and "Select" at the bottom. A "Bridge 1" dropdown is to its right.
- Current Reading Resolution:** A text field containing "8888.8" with a dropdown arrow on the right.
- Current Reading (lbs):** An empty text field.
- Buttons:** "Calibration" (disabled), "Reset To Factory Defaults" (disabled), and "Start Field Calibration" (disabled).

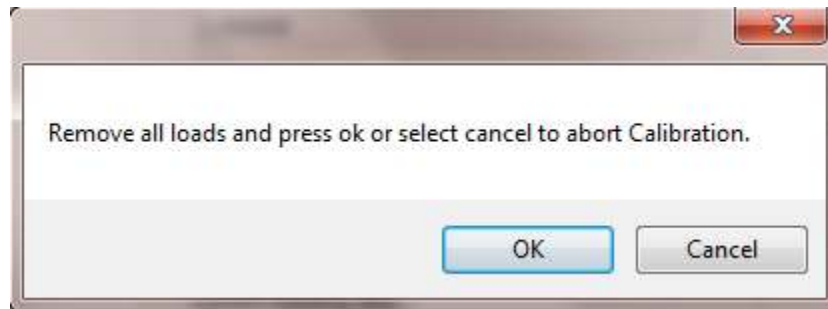
2. Select sensor serial number and bridge from the Device List on the Field Calibration tab.



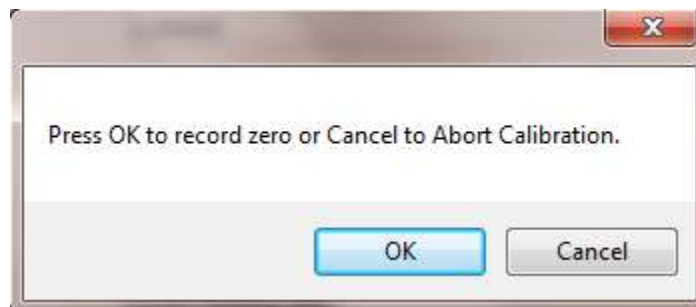
The dialog box titled "Field Calibration for Sensors" contains the following elements:

- Device List:** Two dropdown menus showing "Sensor 1: 21636-1" and "Bridge 1".
- Multiplier For Selected Sensor (read only):** A text field containing "1.000000".
- Buttons:** "Start Field Calibration" (enabled), "Reset To Factory Defaults" (disabled), and "Calibration" (disabled).
- Current Reading Resolution:** A text field containing "88888000" with a dropdown arrow on the right.
- Current Reading (lbs):** A text field containing "92000".

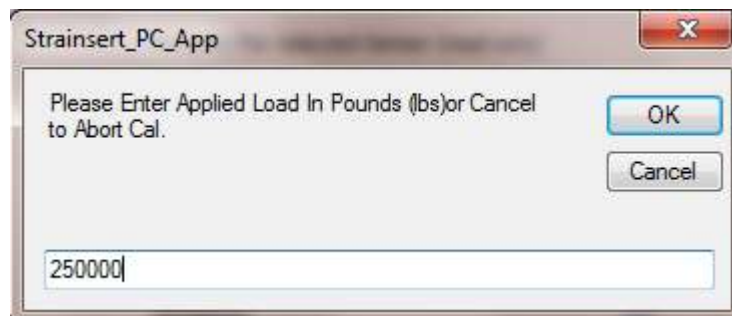
3. Click on Start Field Calibration icon.  
Note: User can abort calibration at any time by pressing Cancel.
4. At prompt, remove all loads from the sensor including any tare weight.



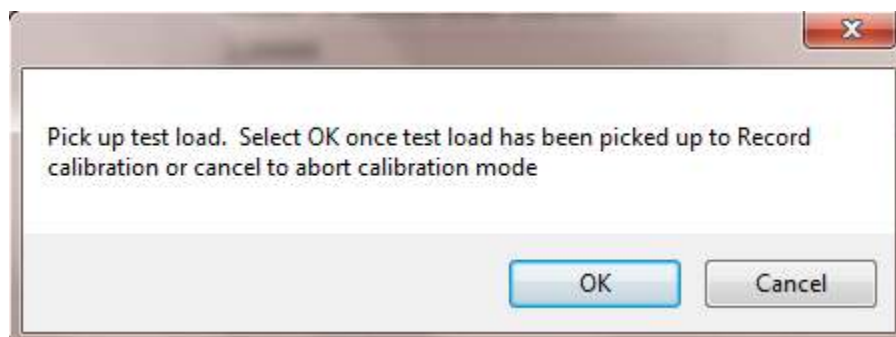
5. At prompt, press OK to record the zero output at no load



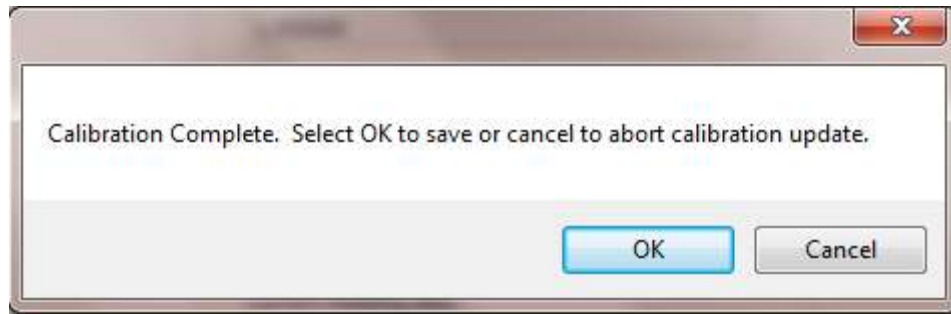
6. If necessary, add any required tare load at this time.
7. Enter Applied Load into numeric field and press OK.  
**NOTE: Applied Load must be between 40 – 100% of the sensor capacity.**



8. After prompt, pick up calibration load, wait for load to stabilize and press OK.



9. Wait for prompt and press OK for acceptance or Cancel to abort.



10. Field Calibration is complete.



## Data Logging

Select Sensors To Log – select sensor to data log by checking the appropriate box

Logging Duration – select Hours, Minutes and Seconds for required data logging period

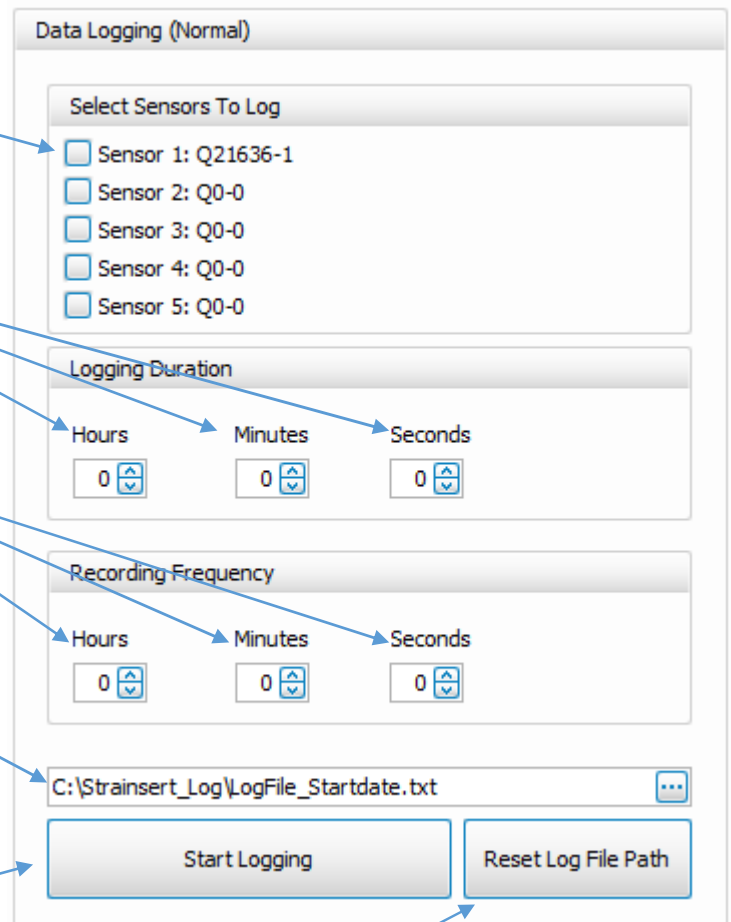
Recording Frequency – select Hours, Minutes and Seconds for required recording interval

Data Log File Path – defaults to C:\Strainert\_Log\LogFile\_Startdate.txt

Note: user has option to rename file or change file path by clicking on ... icon.

Start Logging – press icon to commence immediate data storage

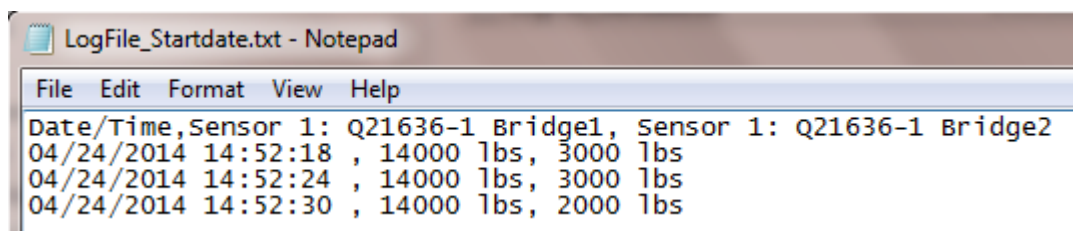
Reset Log File Path – press icon to restore file path to factory default.



The dialog box is titled "Data Logging (Normal)". It contains several sections:

- Select Sensors To Log:** A list of five sensors with checkboxes:
  - Sensor 1: Q21636-1
  - Sensor 2: Q0-0
  - Sensor 3: Q0-0
  - Sensor 4: Q0-0
  - Sensor 5: Q0-0
- Logging Duration:** Three spin boxes for Hours, Minutes, and Seconds, each set to 0.
- Recording Frequency:** Three spin boxes for Hours, Minutes, and Seconds, each set to 0.
- Data Log File Path:** A text field showing "C:\Strainert\_Log\LogFile\_Startdate.txt" with a browse button (three dots) to its right.
- Buttons:** "Start Logging" and "Reset Log File Path".

Data Logging File Format – comma delimited text file



The Notepad window shows the following text:

```

Date/Time,Sensor 1: Q21636-1 Bridge1, Sensor 1: Q21636-1 Bridge2
04/24/2014 14:52:18 , 14000 lbs, 3000 lbs
04/24/2014 14:52:24 , 14000 lbs, 3000 lbs
04/24/2014 14:52:30 , 14000 lbs, 2000 lbs
  
```

## Battery Installation / Replacement




1. Locate Battery cover and unscrew.
2. Pull battery from compartment.



3. Pull wires from the cavity around the battery compartment, thru slots.
4. The connector distance from the circuit board will only extend 2.5" from the end of the cover plate.
5. Depress the clip on the connector to disconnect and remove the battery.
6. Firmly attach new battery connector to ensure connector clip locks in place.
7. Install wire and connector ahead of the battery.
8. Wires and connector need to be tucked into the cavity through the battery compartment.
9. The spring at the bottom of the battery compartment must be free of wires to freely compress.
10. With the battery in the compartment, securely tighten cap, which must have its o-ring installed and properly seated, to provide an environmental seal.



## Troubleshooting

Problem	Possible Cause	Possible Solution
 No Communication	Wrong or invalid serial number	Verify serial number on sensor matches entry on Configuration tab
	Damaged or missing antenna	Verify antenna connection at both the sensor and the gateway
	Improper signal range selection	Change the range selection on the Configuration tab. <30-ft "Short Range" and >30-ft "Standard Range"
	Obstructed RF signal path	Reposition antenna on either or both the sensor and / or gateway.
	Damaged sensor and / or gateway	Call Factory
	Depleted or damaged battery cell	Remove and replace battery cell at sensor
	Gateway / sensor communication lock	Cycle sensor battery connection, Cycle gateway USB and restart application
	Sensor applied load exceeds approximately 40% of rated capacity	Remove applied load; call factory
	Sensor bridge circuit possibly damaged	Call Factory
	For a sensor configured for bi-polar operation, applied load exceeds approximately 40% of rated capacity.	Remove applied load; call factory
	For a sensor configured for uni-polar operation, applied load in reverse direction exceeds approximately 10% of rated capacity	Check sensor orientation or applied load direction.
	Sensor bridge circuit possibly damaged	Call Factory

Problem	Possible Cause	Possible Solution
No changes to displayed readings in response to change in applied load	Sensor bridge circuit possibly damaged	Call Factory
Erratic displayed readings in response to stable applied load	Sensor bridge circuit possibly damaged	Call Factory

### Customer Support

Since 1960 Strainert has pioneered the force transducer industry. Today, we continue to champion the industry with our knowledgeable and dedicated technical, sales and manufacturing team. For application assistance, product information, and troubleshooting contact Strainert.

### **General Contact Information**

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